

Amendments to the Claims:

This listing of claims replaces any and all prior claim lists.

Listing of Claims:

Claim 1 (original). A compound having affinity with a calcified tissue represented by the formula: $(AC)_a\text{-}MC\text{-}(LI)_b$

wherein MC is a mother nucleus and represents a residue of a compound having a plurality of functional groups selected from the group consisting of an amino group, an amide group, a hydroxyl group, a thiol group, a thioether group, a sulfonyl group, a phosphonyl group, an aldehyde group, a carboxyl group, a carbonyl group, a halogen, and a cyano group;

AC is a group having affinity with a calcified tissue;

LI is a ligand for binding to a metal atom; and

a is an integer of 1 or more, and b is 0 or an integer of 1 or more.

Claim 2 (original). The compound having affinity with a calcified tissue according to claim 1, wherein the mother nucleus MC is a residue of a compound selected from the group consisting of a monosaccharide, an oligosaccharide, an amino oligosaccharide, a cyclodextrin and a saccharide dendrimer.

Claim 3 (currently amended). The compound having affinity with a calcified tissue according to ~~claim 1 or 2~~ claim 1, wherein the AC is selected from the group consisting of polyaspartic acid, polyglutamic acid and organic phosphonic acid.

Claim 4 (original). The compound having affinity with a calcified tissue according to claim 1, wherein the mother nucleus MC is a residue of a compound selected from the group consisting of an oligosaccharide, an amino oligosaccharide, a cyclodextrin and a saccharide dendrimer, and the group AC having affinity with a calcified tissue is bonded to a constituent monosaccharide of the mother nucleus MC, and the ligand LI for binding to a metal atom is bonded to a constituent monosaccharide other than the above-mentioned constituent monosaccharide.

Claim 5 (original). The compound having affinity with a calcified tissue according to claim 4, wherein a plurality of the groups AC having affinity with a calcified tissue or a plurality of the ligands LI for binding to a metal atom are bonded to the mother nucleus MC.

Claim 6 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 5~~ claim 1, wherein at least one of the mother nucleus MC, the group AC having affinity with a calcified tissue and the ligand LI contains a metal atom or an isotope of a halogen atom, carbon, oxygen, nitrogen, sulfur or phosphorus.

Claim 7 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 6~~ claim 1, which forms a complex with a metal atom.

Claim 8 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 7~~ claim 1, wherein the mother nucleus MC is a residue of a linear or branched oligosaccharide of 2 to 20 saccharide units which comprises a constituent monosaccharide selected from the group consisting of glucose, mannose and galactose.

Claim 9 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 7~~ claim 1, wherein the mother nucleus MC is a residue of a linear or branched amino oligosaccharide of 2 to 20 saccharide units which comprises a constituent monosaccharide selected from the group consisting of glucosamine, mannosamine and galactosamine.

Claim 10 (original). The compound having affinity with a calcified tissue according to claim 9, wherein a part of the amino oligosaccharide that constitutes the mother nucleus MC is reduced.

Claim 11 (original). The compound having affinity with a calcified tissue according to claim 9, wherein a part of the amino oligosaccharide that constitutes the mother nucleus MC is N-acetylated.

Claim 12 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 8 to 11~~ claim 8, wherein the oligosaccharide or amino oligosaccharide comprises constituent monosaccharides that are α - or β -linked.

Claim 13 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 8 to 11~~ claim 8, wherein the oligosaccharide or amino oligosaccharide comprises constituent monosaccharides that are 1-3, 1-4 or 1-6-linked.

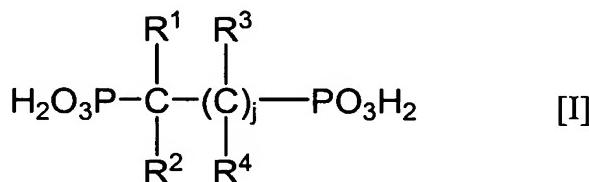
Claim 14 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 7~~ claim 1, wherein the mother nucleus MC comprises a residue of a cyclodextrin selected from the group consisting of α -, β - and γ -cyclodextrins.

Claim 15 (original). The compound having affinity with a calcified tissue according to claim 14, wherein the cyclodextrin is a dialdehyde saccharide which comprises a constituent monosaccharide that is reduced at positions 2 and 3.

Claim 16 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 7~~ claim 1, wherein the mother nucleus MC comprises a residue of a saccharide dendrimer, and the saccharide dendrimer comprises a linear or branched saccharide bonded to a core comprising a polycarboxylic acid or an alkyl polycarboxylic acid.

Claim 17 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 7~~ claim 1, wherein the mother nucleus MC comprises a residue of a saccharide dendrimer, and the saccharide dendrimer comprises a linear or branched saccharide bonded to a core comprising a polyamine or an alkylpolyamine.

Claim 18 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 17~~ claim 1, wherein the group AC having affinity with a calcified tissue comprises an organic phosphonic acid, and the organic phosphonic acid is a residue of a diphosphonic acid represented by the following formula I, derivatives thereof or salts thereof:



(wherein,

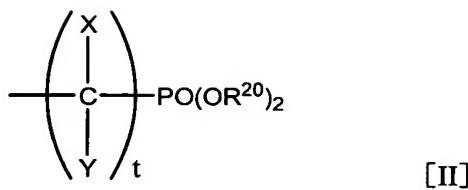
R¹ and R³, which are the same or different, each represents a formula -(CR⁵R⁶)_k-R⁷-
(CR⁸R⁹)_m-R¹⁰_n-(CR¹¹R¹²)_o-R¹³_p-(CR¹⁴R¹⁵)_qR¹⁶ (wherein R⁵, R⁶, R⁸, R⁹, R¹¹, R¹², R¹⁴, R¹⁵ and
R¹⁶ are groups each independently selected from the group consisting of H, -OH, -COOH, -
C(NH₂)=NH, -CN, -SO₃H, -NR¹⁷₂ and a halogen atom, R¹⁷ is independently H or -(CH₂)_rCH₃
respectively, R⁷, R¹⁰ and R¹³ are groups each independently selected from the group
consisting of sulfur, oxygen, amide, imide, a divalent heterocycle consisting of 3 to 12 atoms
and a cyclic hydrocarbon (Ar(R¹⁸)_r-R¹⁹)_s, R¹⁸ is -CR⁵R¹⁷, R¹⁹ is independently selected from
the group consisting of H, -OH, -COOH, -C(NH₂)=NH, -CN, -SO₃H, -NH₂, -NHMe, -NMe₂
and a halogen atom; k, l, m, n, o, p and q are each independently 0 or an integer of 1 or more,
r is 0 to 3, s is 0 to 12, and the sum total of k, l, m, n, o, p and q is 0 to 12);

R² is a group selected from H, -OH, -NH₂, -NHMe, -NMe₂, -CN, and a lower alkyl
group (which may be substituted with one or a plurality of polar groups);

R⁴ is a group selected from H, -OH, -NH₂, -NHMe, -NMe₂, -CN, -SO₃H, a halogen
and a lower alkyl group [[()]] which may be optionally substituted with one or a plurality of
polar groups[()]]; and

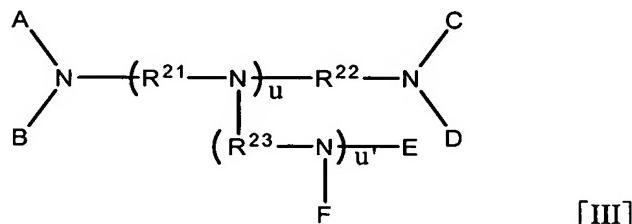
j is 0 or 1 [[()]] provided that, when j is 0, R¹ is not H and when j is 1, both of R¹ and
R³ cannot be H[()]].

Claim 19 (currently amended). The compound having affinity with a calcified tissue
according to ~~any one of claims 1 to 17~~ claim 1, wherein the group AC having affinity with a
calcified tissue comprises an organic phosphonic acid, and the organic phosphonic acid is an
organic aminophosphonic acid derivative having an amine nitrogen atom to which a group
represented by the formula II is bonded, or an ester or a salt thereof:

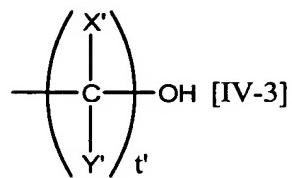
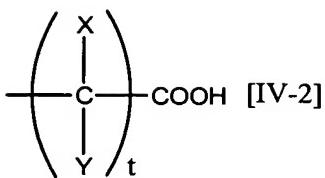
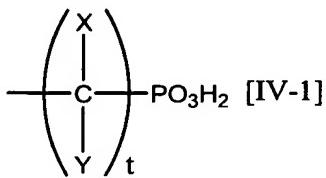


[[()]]wherein t is an integer of 1 to 8; X and Y are each independently selected from hydrogen, a halogen group, a hydroxyl group, a carboxyl group, a carbonyl group, a phosphonic acid group, and a hydrocarbon group having 1 to 8 carbon atoms, and when t is larger than 1, each X and Y may be the same or different; R²⁰ is selected from hydrogen, a silyl group, an alkyl group, a benzyl group, sodium and potassium[()]].

Claim 20 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 17~~ claim 1, wherein the group AC having affinity with a calcified tissue comprises an organic phosphonic acid, and the organic phosphonic acid is a phosphonic acid derivative represented by the formula III, an ester or a salt thereof.



[[()]]wherein each u and u' is independently an integer of 0 to 5, preferably 0, 1, or 2; R²¹, R²² and R²³ are each independently -(CH₂)_v- wherein [[()]]v= 1 to 5[()]]; A, B, C, D, E, and F are each independently selected from the group consisting of hydrogen, a methyl group, an ethyl group, an isopropyl group, a pivaloyl group, a benzyl group, an acetyl group, a trifluoroacetyl group, and groups of the following formulae IV-1 to 3, and one of A, B, C, D, E and F is the group of following formula IV-1.



[[()]]wherein t, X and Y are the same as in the above-mentioned formula II; t' is 2 or 3; X' and Y' are each independently selected from hydrogen, a methyl group and an ethyl group, and each X' and Y' may be the same or different[()]].

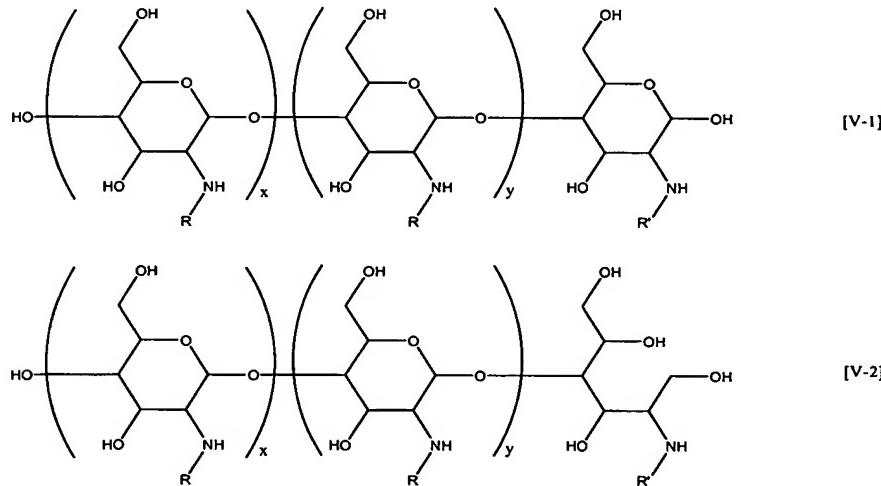
Claim 21 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 20~~ claim 1, wherein the ligand (LI) for binding to a metal atom has a coordinating atom selected from oxygen, sulfur, phosphorus, nitrogen and carbon.

Claim 22 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 20~~ claim 1, wherein the ligand (LI) for binding to a metal atom is selected from the group consisting of ethylenediaminetetraacetic acid (EDTA), diethylenetriaminepentaacetic acid (DTPA), triethylenetetraaminehexaacetic acid (TTHA), cyclam, 1,4,8,11-tetraazacyclotetradecane-1,4,8,11-tetraacetic acid (TETA), 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA), N{1-2,3-dioleyloxy}propyl-N,N,N-triethylammonium (DOTMA), mercaptoacetylglycylglycine (MAG3), ethylene cysteine dimer (ECD), hydrazinonicotinyl (HYNIC), lysine-tyrosine-cysteine (KYC), cysteine-glycine-cysteine (CYC), N,N'-bis(mercaptoproacetamide)ethylenediamine (DADS), N,N'-bis(mercaptoproacetamide)-2,3-diamine propanoic acid (CO2DADS), N,N'-bis(2-mercaptoproethyl)ethylenediamine (BATS), thiosemicarbazone, propylene amineoxime (PnAO), and other amineoxime ligands and derivatives thereof.

Claim 23 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 21~~ claim 1, wherein the AC or LI has a linker L through which the AC or LI is coupled with the mother nucleus MC.

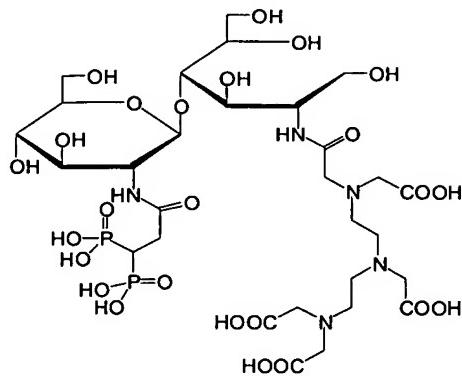
Claim 24 (original). The compound having affinity with a calcified tissue according to claim 22, wherein the linker L is selected from the group consisting of peptide, alkyl, and alkyl ether, alkylamide, alkylamine and alkylolefin represented by formula $-(CH_2)_w-R^{24}-$ $(CH_2)_w-$ (wherein w is each independently 0 to 5, and R^{24} is O, S, NHCO, NH, or $CH=CH$).

Claim 25 (currently amended). The compound having affinity with a calcified tissue according to claim 1, which is represented by the following formula V-1 or V-2:



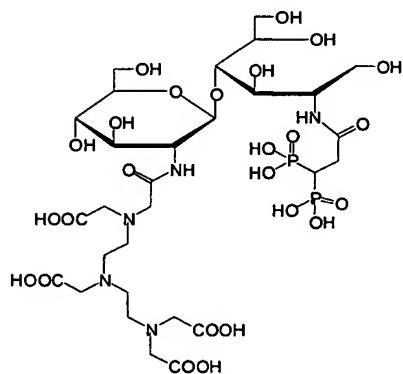
[[()]]wherein R and R' are each independently a group AC having affinity with a calcified tissue or a ligand LI for binding to a metal atom, and at least one of them is the group AC having affinity with a calcified tissue; x and y are each independently 0 to 19; and x+y is 1 to 19[()]].

Claim 26 (original). The compound having affinity with a calcified tissue, represented by the following formula VI-1:



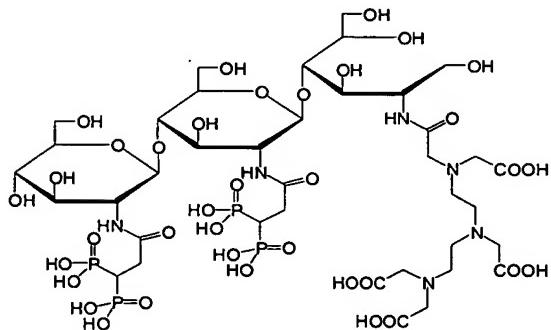
[VI- 1]

Claim 27 (original). The compound having affinity with a calcified tissue, represented by the following formula VI-2:



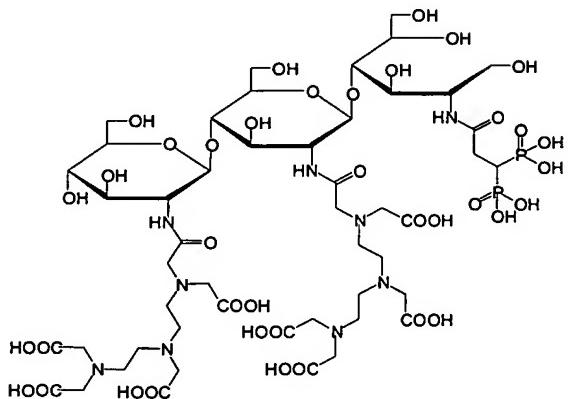
[VI- 2]

Claim 28 (original). The compound having affinity with a calcified tissue, represented by the following formula VII-1:



[VII- 1]

Claim 29 (original). The compound having affinity with a calcified tissue, represented by the following formula VII-2:



[VII-2]

Claim 30 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 25 to 29~~ claim 25, which forms a complex with a metal atom.

Claim 31 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 30~~ claim 1, wherein the metal atom which forms a complex or a metal atom or isotope element contained in the mother nucleus MC, the group AC having affinity with a calcified tissue or the ligand LI is an element selected from the group consisting of elements of atomic number 6-9, 15-17, 21-29, 31, 35, 37-44, 49, 50, 53, 56-70, 72-75, 81, 83 and 85.

Claim 32 (original). The compound having affinity with a calcified tissue according to claim 31, wherein the metal atom is radioactive, paramagnetic or X-ray impermeable.

Claim 33 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 30~~ claim 1, wherein the metal atom or isotope element is a radioactive nuclide selected from the group consisting of 11-C, 15-O, 18-F, 32-P, 59-Fe,

67-Cu, 67-Ga, 81-Rb, 89-Sr, 90-Y, 99m-Tc, 111-In, 123-I, 124-I, 125-I, 131-I, 117m-Sn, 153-Sm, 186-Re, 188-Re, 201-Tl, 211-At, 212-Bi and 213-Bi.

Claim 34 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 30~~ claim 1, wherein the metal atom or isotope element is an element selected from the group consisting of chromium (III), manganese (II), iron (II), iron (III), praseodymium (III), neodymium (III), samarium (III), ytterbium (III), gadolinium (III), terbium(III), dysprosium (III), holmium (III), and erbium (III).

Claim 35 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 30~~ claim 1, wherein the metal atom or isotope element is an element selected from the group consisting of bismuth, tungsten, tantalum, hafnium, lanthanum, lanthanide, barium, molybdenum, niobium, zirconium and strontium.

Claim 36 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 35~~ claim 1, which is in a form of a salt, a hydrate, a solvate, an aggregate, an aqueous solution or a lyophilized product.

Claim 37 (currently amended). The compound having affinity with a calcified tissue according to ~~any one of claims 1 to 36~~ claim 1, wherein the particle size is 1 nm to 50 μm .

Claim 38 (currently amended). A composition for producing a complex compound having affinity with a calcified tissue, which comprises a compound having affinity with a calcified tissue according to ~~any one of claims 1 to 6 and 8 to 29~~ claim 1, a peroxide ion of a transition metal, and a reducing agent.

Claim 39 (currently amended). A therapeutic agent which comprises a compound having affinity with a calcified tissue according to ~~any one of claims 1 to 37~~ claim 1.

Claim 40 (currently amended). A pharmaceutical composition which comprises a compound having affinity with a calcified tissue according to ~~any one of claims 1 to 37~~ claim 1 or a salt thereof and at least one pharmacologically acceptable carrier.

Claim 41 (currently amended). A kit for preparing a radioactive labeled compound, which comprises a compound having affinity with a calcified tissue according to ~~any one of claims 1 to 37~~ claim 1.

Claim 42 (currently amended). A diagnostic agent, imaging agent or therapeutic agent, which comprises a compound having affinity with a calcified tissue according to ~~any one of claims 1 to 37~~ claim 1.

Claim 43 (original). A radioactive labeled compound diagnostic agent, imaging agent or therapeutic agent, which comprises a compound having affinity with a calcified tissue according to claim 33, a salt or an aggregate thereof.

Claim 44 (original). A nuclear magnetic resonance imaging agent which comprises a compound having affinity with a calcified tissue according to claim 34, a salt or an aggregate thereof.

Claim 45 (original). An X-ray imaging agent which comprises a compound having affinity with a calcified tissue according to claim 35, a salt or an aggregate thereof.

Claim 46 (original). A method of selectively modifying an amino group at a terminal end, which comprises providing an amino oligosaccharide having 2 to 50 saccharide units which consists of one or more monosaccharides selected from the group consisting of glucosamine, mannosamine and galactosamine and is reduced at a terminal end thereof, and subjecting the amino oligosaccharide to a reaction for generating a carbamate compound.

Claim 47 (original). A method of selectively modifying an amino group at a terminal end with a butoxycarbonyl (Boc) group, which comprises reacting, dibutyl dicarbonate, an aminosaccharide of 2 to 13 saccharide units which consists of one or more monosaccharides selected from the group consisting of glucosamine, mannosamine and galactosamine and reduced at a terminal end thereof.